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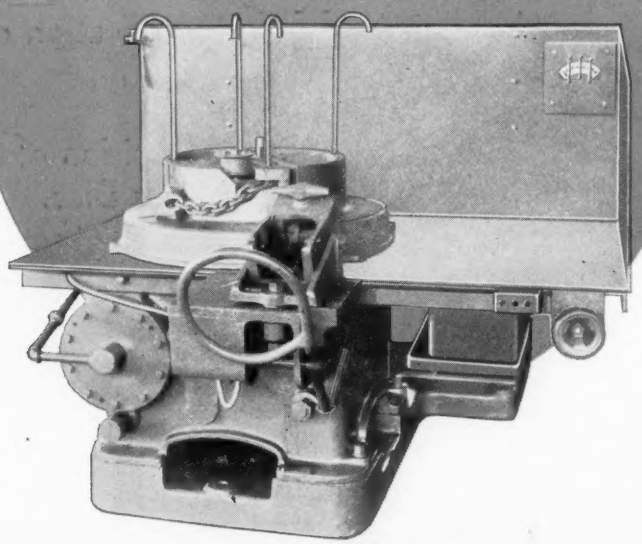

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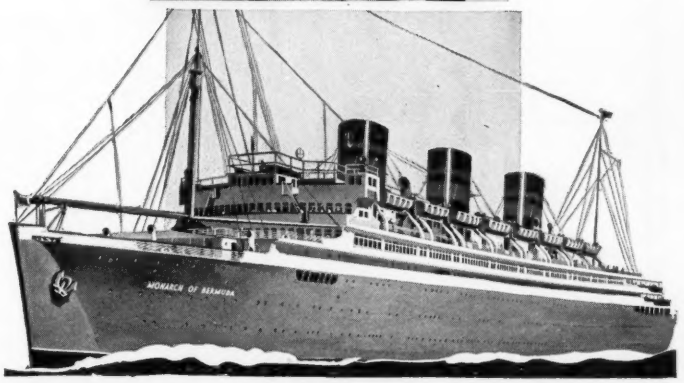

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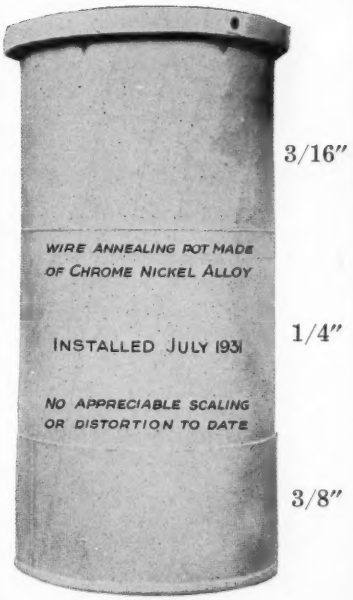

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WIRE & WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 7 SEPTEMBER, 1932 No. 9

Why Adequate Lighting?

By A. L. Lyman

General Electric Co., Nela Park Engineering Dept., Cleveland, Ohio

A discussion of the safety factors and improvement in working conditions obtained through proper mill lighting. This will be followed by an article on specific wire mill lighting problems.

EVEN today, when machine methods have practically replaced human hands in many factory operations, the worker's eyes are still called upon to function accurately and steadily over long periods of time. Because seeing is so vitally dependent upon the quantity and quality of illumination, it is of the greatest importance that the light provided for the work be given careful consideration by the management so that it may be the best available and will bring the most satisfactory results. Simple tests prove conclusively that as the quantity of illumination is increased and the quality improved, the worker is able to see quicker and better. This change in his seeing ability is responsible for the improvement in his work. Under better illumination he will do faster work with a consequent decrease in the cost of production—he will make fewer errors and thus will produce a higher quality product with decreased spoilage—and he will be better able to avoid accidents.

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The Value of Adequate Lighting

FIGURE I shows the relation between the level of illumination and the time required for per-

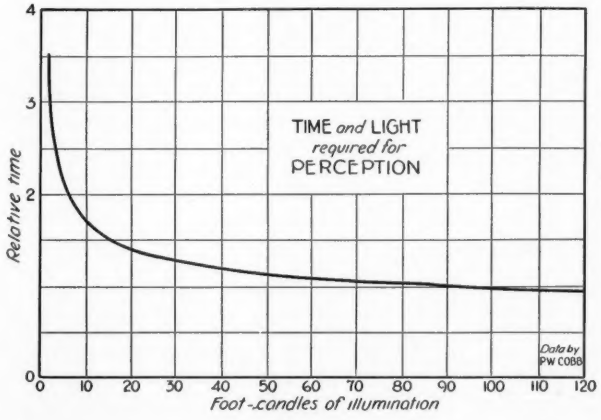

Fig. 1

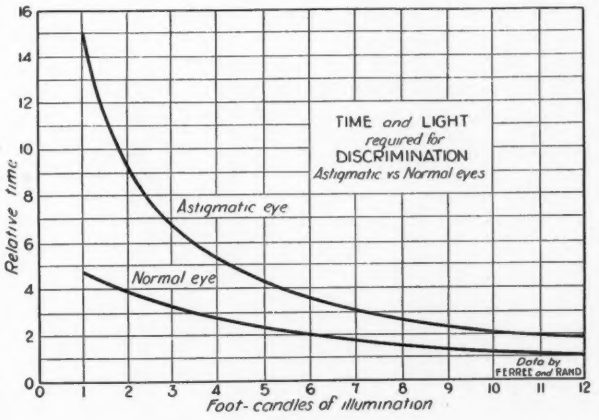
TIME and LIGHT
required for
DISCRIMINATION
Astigmatic vs Normal eyes
Astigmatic eye
Normal eye
Relative time
Foot-candles of illumination
Data by FERREE and RAND
0 2 4 6 8 10 12 14 16
0 1 2 3 4 5 6 7 8 9 10 11 12

Fig. 2

Designated as Official Publication by the Wire Association

ceiving an object. A significant fact, seen in this chart, is that it takes about twice as long to see at three footcandles as it does at 25 footcandles.

Statistics compiled by the Eyesight Conservation Council of America show that out of approximately 200,000 people employed by industrial and commercial establishments, 44 per cent have defective vision, and 25 per cent of those remain uncorrected.

Fig. 3. Direct glare from a bare lamp is one of the greatest hazards to vision. Note how much of the light is wasted by glare.

TESTS have proved that defective eyes always require longer time in seeing than do normal eyes under the same illumination. The curves in Figure 2 covering the lower intensities of artificial lighting show this to be true in the case of the astigmatic eye. They show that an increase in illumination benefits the astigmatic eye to a relatively greater extent than the normal eye, and that the defective eye, aided by a high level of illumination, is able to see just as quickly as the normal eye which is subject to a lower level of illumination.

✦ ✦ ✦

ANOTHER test has shown that when the level of illumination is raised from 3 to 12 footcandles, the rate of working of those with better eyes increases 14 per cent, while the rate of those with poorer eyes increases 22 per cent. Thus light, as a tool for seeing, helps those who need help most.

In many factories better lighting means decreased production costs, reduced spoilage, a higher quality product, and an increase in the morale of the workers. In all factories it means greater safety for the workers. That in itself is sufficient to justify better lighting, for money cannot replace a crippled body or pay for a human life.

✦ ✦ ✦

IT was estimated by the National Safety Council that the number of fatal accidents in the United States arising out of or in the course of gainful employment amounted to 19,000 for the year 1930, and that during the same period the "lost-time" non-fatal accidents reached the staggering total of 2,500,000, or about one accident for every 19 persons gainfully employed!

Adequate illumination is logically included in the list of safeguards against accident—it acts as a guard in pointing out hazards, and aids in avoiding them just as effectively as a railing points out the danger of a revolving flywheel and provides protection against it.

✦ ✦ ✦

Light Sources Available

FACTORIES are usually so constructed as to take full advantage of natural daylight, but very often daylight itself is inadequate. In spite of the generous supply of light from the sun, it cannot provide the full amount of illumination each worker needs on his work, because the amount of daylight decreases rapidly as the distance at which the worker is located from the windows is increased. Even though the day outside is clear, those workers farthest from the windows will probably have insufficient illumination. Often on cloudy days, and especially during the shorter days of the year, those workers closer to the windows and even next to them do not receive the light they require.

✦ ✦ ✦

IT is essential, therefore, that the modern factory be equipped with an artificial lighting system which will provide adequate illumination over the entire working area. A carefully designed overhead lighting system assures the workers of adequate illumination regardless of their location.

✦ ✦ ✦

Quantity and Quality of Light

BECAUSE of the beneficial results of more light provided for the worker, the level of illumination in the average factory has been increasing year by year.

What was believed to be good enough lighting ten years ago is no longer considered adequate.

The quality of the light is even more important than the quantity. Often, though there is plenty of light, it may be producing so much direct or reflected glare in the eyes of the workers that they are partially blinded. Bothersome shadows result if the lighting units are placed too far apart. Glare and shadows must be avoided, because they lower the efficiency of workers and are an additional accident hazard. When the lighting is inadequate, there is not only greater danger of personal injury through failure to see fast moving machinery and other hazards, but also a greater tendency to allow unnecessary obstructions to exist and materials and machines to be out of place.

✦ ✦ ✦

General Lighting

AN overhead lighting system consists of light sources symmetrically arranged, usually according to bays, to produce approximately uniform illumination over the entire working area. General lighting is far superior to local lighting; it relieves light and dark contrasts, brightens up the general appearance of the shop, and promotes safety and sanitary conditions. Often where extremely fine work or work involving an element of danger is to be done, the use of local lighting units is desirable to obtain a well controlled high level of illumination, but these should supplement the general lighting system—they should not be used in place of it.

✦ ✦ ✦

Reflecting Equipment

IN order that the light given off by the incandescent lamp may be properly directed, distributed, and diffused, and in order that the eyes of the workmen may be protected from glare, it is essential that properly designed reflectors be employed. These should be selected for their efficiency, durability, cost, and ease of maintenance.

The Glassteel Diffuser furnishes a high quality of illumination without excessive brightness, harsh shadows, or direct or reflected glare, and at the same time gives a pleasing appearance to the room. This unit consists of a porcelain enamelled steel reflector fitted with an opal glass diffusing globe which completely encloses the lamp, thereby combining in a single lighting unit the light directing qualities of a porcelain enamelled reflector with the light diffusing qualities of an opal glass globe. Small openings in the top of the reflector allow a small amount of light to pass upward to the ceiling.

The RLM Standard Dome Reflector is a type widely used for general lighting. It provides a desirable distribution of light over the working plane, is efficient in reflection of light, and is easy to clean.

The High Bay unit should be used where relatively high ceilings are encountered. It is designed to concentrate the distribution of light over a smaller area, and in so doing, avoids undue waste on the sidewalls.

(*Please turn to page 300*)

Fig. 4. In this plant 1000-watt MAZDA lamps are used in suitable reflectors spaced 25 feet x 30 feet apart and mounted 35 feet high. ✦ ✦

Special Bronze For Telephone and Telegraph Conductors

PART I

Translated from Chemisch-Metallurgische Zeitschrift of August 8, 1931

By Samuel J. Rosch, Cable Engineer
Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y.
Assisted by Otto F. Jagielski, Consulting Wire Mill Engineer

IN various European countries, the Post Office as well as the Railroad organizations do not use for their telephone and telegraph lines plain copper conductors, but use instead bronze conductors. For these conductors, quite different specifications for the mechanical and physical properties are required. For that reason, consistent with the best possible conductivity, they require extraordinarily high tensile strength and bending strength; in many cases requiring even double the tensile strength possessed by copper conductors. In the following table are given the requirements for Post Office wires as used by the Austrian, Roumanian and Polish governments.

IN the following tables, the first column contains the diameters of the wires in mm; the second column the load in kgms. at which the wire breaks; in the third column the tensile strength in kgms. per sq. mm.; in the fourth column the percentage elongation; in the fifth and sixth columns, the number of bends which the wires absolutely must withstand. Wires which are larger than 3 mm. in diameter are bent between two jaws which are rounded to a radius of 10 mm. For wires having diameters 3 mm. and smaller, the bending is done between jaws rounded to a diameter of 5 mm. The bending is done through an arc of 180°. Column 7 gives the minimum number of twists for a length between jaws of 150 mm. (six inches). In column 8 is given the maximum conductor resistance in ohms per kilometer @ 15° C. and in column 9 is given the conductivity at 15° C. The conductivity is a function of the resistance and is the reciprocal of the value of the specific resistance at 15° C.

$$L_{15°C.} = \frac{1}{\text{Spec. Resist.}_{15°C.}}$$

The specific resistance is calculated by multiplying the absolute resistance by the cross-sectional area. The absolute resistance is obtained by direct measurement.

ϕ	F: Kgm.	F: Kgm/mm²	D	B-10 mm	B-5 mm	T		L
Diam. in mm.	Breaking Load in kgms.	Tensile in kgms/sq. mm.	Elongation in %	No. of Bends Using Jaws with 10 mm. rad.	No. of Bends Using Jaws with 5 mm. rad.	Minimum No. of Twists for a 150 mm. length.	Max. Resistance in ohms/km. @ 15° C.	Conductivity @ 15° C.
AUSTRIA								
5.0	982	50	2	6	—	15	1.0	50
4.5	795	50	2	7	—	17	1.3	50
4.0	630	50	2	9	—	18	1.6	50
3.5	480	50	2	10	—	20	2.0	50
3.0	355	50	2	—	6	22	2.8	50
2.5	350	72	2	—	7	20	6.5	31
2.0	235	75	2	—	8	25	6.0	29
1.5	125	70	2	—	12	30	16.0	35
ROUMANIA								
2.5	368	75	2	—	8		7.86	26
2.0	235	75	2	—	8		12.24	26
1.5	132	75	2	—	9		21.78	26
POLAND								
5.0	982	50	2	6	—	17	1.0	50
4.0	630	50	2	7	—	18	1.6	50
3.0	355	50	2	—	6	22	2.8	50
2.5	295	60	2	—	8	23	4.94	41
2.0	220	70	2	—	8	24	9.0	35
1.5	124	70	2	—	8	30	16.9	35
1.2	79	70	2	—	12	33	25.0	35

IN this measurement it is necessary to observe the temperature at which the test is made since the resistance varies with temperature; in other words, the resistance rises and falls with corresponding charge in temperature. It is therefore necessary to convert the value obtained on the instrument, to its corresponding value at 15°C. The temperature coefficient is 0.004 which means that per each degree Centigrade, the absolute resistance changes in value by 0.4%. For example, a bronze wire of 3 mm. diameter gave a resistance of 0.00276 ohms per meter at 18°C. The absolute resistance at 15°C. is equal to 0.00276—1.2% (or 3 x 0.4%) which gives 0.00276—0.00003312 =0.002727 ohms per meter. The specific resistance then becomes the product of the absolute resistance times the cross-sectional area which equals 0.002727 x 7.0068= 0.019107. The conductivity at 15°C. is therefore

$$L_{15°C.} = \frac{1}{\text{Spec. Resist.}_{15°}} = \frac{1}{0.019107} = 50$$

✦ ✦ ✦

The Alloying of the Conductor Materials

IT is quite feasible to obtain high tensile strength with bronze, when the conductivity is not a drawback. It is quite different, however, when simultaneous with strength, low resistance is also required. Copper, when alloyed with other metals, loses its high conductivity. Pure copper has a conductivity of 57 at 15°C. If the proposition presents itself to furnish 2 mm. diameter bronze wire to the Austrian specifications, we have a spread between 57% as the conductivity of pure copper and 29 as that of bronze. It therefore becomes important not to alloy more of the foreign metals to the copper than this spread allows. If we now produce an alloy bordering on the lowest range of conductivity, and then work the alloy in the normal manner to produce wire, the result will be wire not having a tensile strength of 75 kgms/mm², but in the best case only 68 kgms/mm². Where it is necessary to retain high conductivity, alloying alone will not produce high tensile strength, but the additional tensile has to be obtained as a result of a better understanding of the succeeding mechanical operations.

✦ ✦ ✦

IN order to obtain the very high tensile and bending requirements, it is absolutely necessary that the cast alloy be very dense and absolutely free of pores and air holes or bubbles. It is therefore in every case necessary to have the mold properly vented during the casting of the alloy. The well known deoxidizing agents used for copper, bronze and brass cannot be used on those bronze alloys for telephone and telegraph work, because they lower the conductivity very rapidly. The worst of these materials as far as conductivity is concerned is phosphor which even in small quantities, lowers the conductivity considerably. Phosphor is therefore added only in such small quantities as will tend to reduce porous casting, the chief means of deoxidation being obtained by the use of metallic cadmium. Beside this, a small percentage of metallic silicium is added, which tends to increase the density or toughness. This addition of silicium manifests itself particularly in the bending strength. Bronze alloys which do not possess tensile strengths exceeding 50 kgms/mm², do not receive any further additional mixtures. If tensile strengths in excess of 50 kgms/mm² are required, it becomes necessary to add some tin to the alloy.

✦ ✦ ✦

WIRES having 50 kgms/mm² tensile as for example the Austrian wires of 3 to 5 mm. diameter as well as the Polish 3 to 5 mm. diameters are made from the following alloy.

Copper—180 kgms.
Phosphor—20 gms.
*Silicium—25 gms.
Cadmium—300 gms.

WIRES with 70 kgms/mm² tensile as for example the Austrian wire of 1.5 mm. diameter or the Polish wires of 1.2 to 1.5 mm. diameter are made from an alloy as follows:

Copper—180 kgms.
Phosphor—20 gms.
*Silicium—20 gms.
Cadmium—900 gms.
Tin—1050 gms.

✦ ✦ ✦

WIRES with tensile of 75 kgms/mm² as for example the Austrian wires of 2 mm. diameter and the Roumanian wires, are made from an alloy as follows:

Copper—180 kgms.
Phosphor—20 gms.
*Silicium—20 gms.
Cadmium—1000 gms.
Tin—1675 gms.

✦ ✦ ✦

Ingots

IT is not advisable to cast ingots having a weight in excess of 90 to 100 kgms. because with larger ingots, the succeeding mechanical operations become more difficult. In these operations, it is most important to retain a definite temperature whereas with larger ingots such temperature can not be retained uniformly throughout the ingot. The best means for melting this alloy is by the crucible furnace. In the crucible, the constituents of the alloy are furthest removed from the damaging influence of the heating gases, and it is also more difficult for the copper to absorb acids, as it would tend to do in the open hearth furnace. The furnace, however, must be built so as to be able to melt the copper in the shortest period of time, and must be heated to at least 1200° C. The melting period must not take more than one hour. The best copper grades for this work according to my researches, are those ingots marked DRW or

*Translator's Note: Silicium according to Webster's Unabridged Dictionary, is another name for Silicon.

(*Please turn to page 303*)

The Testing of Rope Wire and Wire Rope

By A. V. de Forest, Consulting Engineer
American Cable Co., Bridgeport, Conn.
and
L. W. Hopkins, Materials Engineer
Page Steel & Wire Co., Bridgeport, Conn.

PART I

Wire rope is probably subject to more abuse and less discrimination in the field than any other accurately designed and constructed mechanism. For this reason, accurate prediction of rope life on the basis of laboratory tests is often disappointing. Service records show, however, that the general level of rope performance is raised by the improvement of the component materials. This improvement can best be effected by the application of suitable test methods for the measurement of quality evolution.

The development of such test methods has in itself been the subject of considerable research here and abroad. This paper describes a few of the methods applied to wire and wire rope by the authors, and typical applications of the resultant test data.* ▼ ▼ ▼ ▼ ▼

THE structural engineer is in the habit of dealing with relatively low unit stresses and rigid structures. The gross stresses can be computed with reasonable accuracy and within fairly close limits. Safety factors can be more or less economically introduced to cover the unknown. The materials used are of the type having high damping characterisics and the sum of static and dynamic stresses is usually kept well below the endurance limit. The structural engineer will not hesitate, however, to swing a load of girders over a busy street by means of a wire rope in which the tension stresses total one-fourth of the breaking strength, and the bending stresses total one-half of the breaking strength. Acceleration and retardation stresses may easily account for another 5 or 10 per cent. In spite of the high operating stresses, few serious accidents occur. This condition is no mean accomplishment on the part of the rope engineer. The use of adequate test methods applicable to wire and rope serve as a measure of his success, and a basis for improvement.

THE testing of wire and rope in relation to useful service is by no means simple, as the rather extensive work by manufacturers and technical societies indicates.[3, 4, 5, 6, 7] The divergence of opinion[8] as to the interpretation of results and the absence of tests embracing the fatigue properties of wire led to the development of test methods and the following investigations.

Testing of Rope Wire

THE inspection testing of rope wire is mostly limited to the determination of gage, breaking strength, number of 90-deg. reverse bends before failure, and the number of 360-deg. twists or torsions in a unit length (usually equivalent to 100 wire diameters) before failure. Endurance tests of rope wire have hitherto not been successful but the fatigue properties of the wire must form a most important part of the general problem. The requirements of an endurance test may be summarized as follows:

1. The point of maximum stress should be at the original cold-worked wire surface.
2. The stressed portion of the specimen should be of maximum length.
3. The stress frequency should be high.
4. The necessity of using a machine straightened specimen should be eliminated.

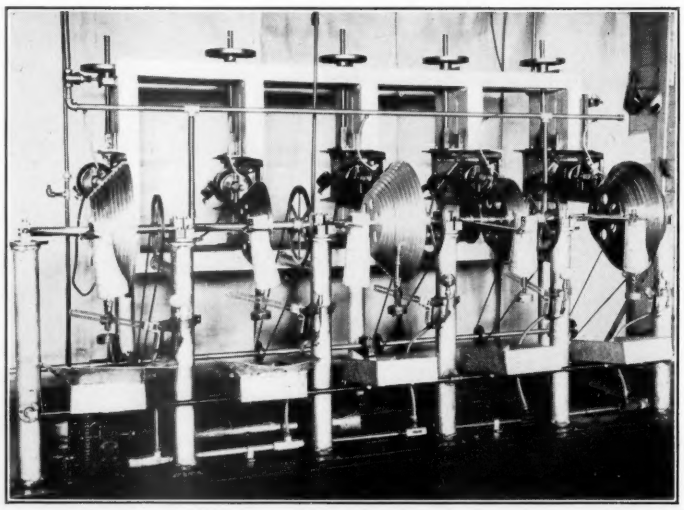

Fig. 1. Fatigue Testing Apparatus For Rope Wire. ✦ ✦ ✦ ✦ ✦ ✦

*A paper presented at the annual meeting of the American Society for Testing Materials, June 1932.

[1]Consulting Engineer, American Cable Co., Inc., Bridgeport, Conn.

[2]Materials Engineer, Page Steel and Wire Co., Bridgeport, Conn.

[3]Walter A. Scoble, First, Second, Third and Fourth Reports of the Wire Rope Research Committee, **Proceedings,** Inst. Mechanical Engrs. (British), October, 1920, p. 835; December, 1924, p. 1193; April, 1928; and June, 1930.

[4]R. Woernle, **Zeitschrift des Vereines Deutscher Ingenieure,** Vol. 73, p. 417 (1929); Vol. 74, p. 1417 (1930); Vol. 75, p. 1485 (1931).

[5]G. Sachs and Sieglerschmidt, **Metallwirtschaft,** Vol. 8, p. 129 (1929); **Mitteilungen der Deutschen Material prufungsanstalten,** Vol. 10, p. 68 (1930).

[6]A. Pomp, C. Duckwitz, and A. Lindeberg, **Jernkontorets Annaler,** No. 8, p. 371 (1931).

[7]Arthur F. Johnson, Bibliography prepared for the Engineering Foundation, April, 1929.

[8]H. L. Whittemore, "The Need of Research on Wire Rope," paper prepared for the Wire Rope Research Committee, Am. Soc. Mechanical Engrs., April, 1929.

FOR wire of uniform rigidity and reasonable straightness, the method employed by Shelton [1]S. M. Shelton, "Fatigue Testing of Wire," *Proceedings*, Am. Soc. Testing Mats., Vol. 31, Part II, p. 204 (1931), can be used, although it is somewhat slow due to the necessity of operating at speeds below the critical period of the specimen. High tensile strength wire of small diameter finished on a draw block is not straight, and it cannot be straightened without considerably changing the elastic characteristics. The elimination of stress concentration at the grips offers a problem which has baffled most investigators working on fatigue of wire under repeated bending and tension.

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Procedure For Studying Fatigue Testing of Rope Wire

THE following testing method and procedure was finally developed for studying the fatigue properties of rope wire. The rotating cantilever beam principle is used in the machine design. The specimen is rotated axially and subject to a constant deflection or bending movement. Cyclic stress reversals from a maximum in compression through zero to a maximum in tension are thus produced.

The deflection is maintained by leading the specimen in axial alignment from a motor driven chuck over a 90-deg. sector of a grooved sheave to a freely rotating chuck. A load is applied to the specimen through a thrust bearing incorporated in the freely rotating chuck. The load is adjusted to be just sufficient to modify the vibratory stresses set up by the whipping of the wire at ends not in contact with the sheave. This whipping action concentrates at the chuck jaws and if too severe, causes breakage at this point. The sheave is rotated away from the driven chuck at a speed of 2 to 5 r. p. m. This sheave movement provides for uniform groove wear, simplifies the lubrication problem, reduces the torsional stresses set up by friction and prevents the formation of minute circumferential scratches. The sheaves are a cast tin bearing bronze or cast aluminum alloys of the heat treated aluminum-copper-silicon (No. 195-16) and aluminum-magnesium (No. 197-57) type. Either type of material gives equally good results. The bottom of the sheave grooves has bearing radii of approximately one wire diameter.

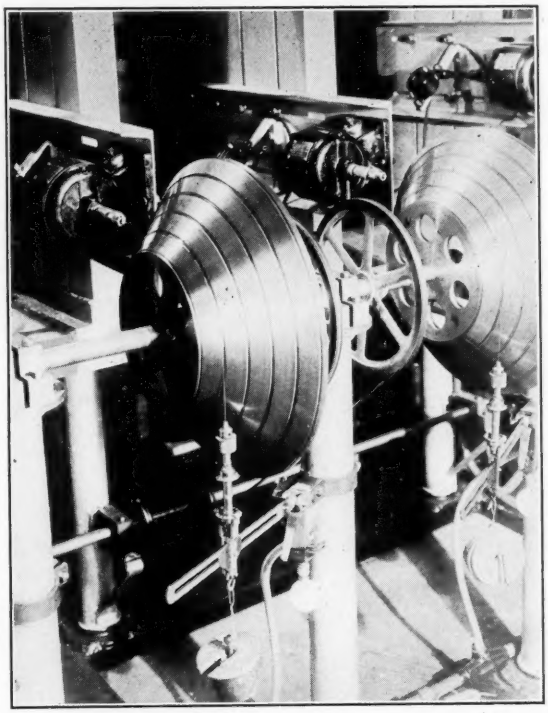

Fig. 2. Sheave Detail Wire Fatigue Machine.

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A HIGH-GRADE motor oil saturated with collodial graphite is continuously supplied to the sheave and is recirculated through a filtering system. Small drill chucks are mounted on direct-current motor spindles. The specimen is rotated on its axis at 3000 r. p. m. Lubrication troubles and maintenance costs are kept at a minimum at this speed. Tests have been successfully run at speeds of 12,000 r. p. m. and bending stresses of 125,000 lb. per sq. in., but lubrication difficulties multiply at excessive speeds resulting in wear of the specimen and sheave. The motors are equipped with Veeder pick counters driven by worm reduction gears with 1000: 1 ratio. Contacts in the motor circuit are opened by the movement of the free chuck upon failure of the specimen. Facilities are provided for the rapid alignment of the wire specimen with the sheave groove. Anti-friction bearings are used throughout to insure smooth operation. The machine is illustrated by Figs. 1 and 2.

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Method of Testing

THE method of testing is similar to conventional fatigue test procedure. Specimens stressed at values approximating the proportional limit are run to failure. Applied stress is lowered with successive tests until a point is reached where failure does not occur within a high order of reversals. During the preliminary work, tests were continued to the conventional value of 10 million reversals. The endurance limit was arbitrarily set at the point where an increase in 2000 lb. per sq.. in fiber stress resulted in a decrease of 100,000 reversals. At this point the cyclic-stress curve is, for practical purposes, a horizontal line and the order of reversals is between 500,000 and 1,500,000 for most wire. This fact, substantiated by rope tests and service records of ropes subject to high bending stresses indicated the questionable value of continuing fatigue tests on rope wire beyond 2,000,000 reversals. The so-called endurance limit is, of course, arbitrary but is within the limits of reason for rope wire.

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AS the wire specimen is deflected to a constant value of strain, stress must be calculated. The conventional curvature formula is used:

Table I.—Wire Selected for Preliminary Endurance Tests.

Group	Type	Diameters, in.	Chemical Properties, per cent					Physical Properties			Endurance Data	
			Carbon	Manganese	Sulfur	Phosphorus	Silicon	Tensile Strength, lb. per sq. in.	Torsions in 100 Diameters	90-deg. Reversed Bend	Endurance Limit, lb. per sq. in.	Endurance Ratio
No. 1	Iron	0.043	0.04	0.18	0.021	0.006	0.005	85 400	5 to 87	100	51 000	60
No. 2	Iron	0.043	0.03	0.29	0.028	0.034	0.004	98 000	76	90	53 000	54
No. 3	Iron	0.043	0.07	0.41	0.034	0.043	0.003	89 500	55	108	56 000	63
No. 4	Iron	0.043	0.06	0.36	0.033	0.029	0.001	85 500	94	86	54 000	63
No. 5	Toughened steel	0.045	0.22	0.44	0.024	0.014	0.07	140 000	41	58	71 000	51
No. 6	Toughened steel	0.045	0.36	0.80	0.027	0.011	0.004	158 500	34	86	71 000	45
No. 7	Toughened steel	0.045	0.37	0.84	0.034	0.014	0.003	158 500	27	78	71 000	45
No. 8	Cast steel	0.040	0.38	0.56	0.049	0.036	0.15	206 800	43	114	82 000	40
No. 9	Cast steel	0.043	0.41	0.58	0.031	0.015	0.19	201 100	44	88	91 000	45
No. 10	Cast steel	0.043	0.41	0.59	0.030	0.013	0.17	219 700	29	72	69 000	32
No. 11	Mild plow	0.040	0.59	0.64	0.027	0.012	0.17	214 800	33	52	73 000	34
No. 12	Plow	0.043	0.68	0.49	0.032	0.012	0.26	239 700	41	90	71 000	30
No. 13	Plow	0.040	0.72	0.54	0.024	0.023	0.16	275 300	38	64	105 000	38
No. 14	Plow	0.040	0.72	0.54	0.025	0.022	0.16	284 800	33	74	102 000	36
No. 15	Improved plow	0.040	0.73	0.51	0.021	0.011	0.21	278 400	38	66	86 000	31
No. 16	Improved plow	0.045	0.71	0.41	0.029	0.022	0.14	284 300	34	84	89 000	31
No. 17	Improved plow	0.045	0.76	0.41	0.029	0.021	0.13	283 000	31	86	75 000	26

$$f_s = \frac{\frac{d}{2}E}{R} + \frac{P}{\pi \frac{d_2}{4}}$$

where f_s=maximum unit fiber stress,
d=diameter of wire,
E=modulus of elasticity, 29,000,000 for steel wire,
R=radius of test sheave from axis to center of the wire,
P=tension on wire, in pounds.

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PRELIMINARY tests made with this equipment included a variety of types of rope wire, the characteristics of which are given in Table 1. Figure 3 shows some typical fatigue curves. This test has proved of value in correlating the various elements of processing with a practical measure of quality. Changes in annealing, patenting, and drafting practices have been made and the resultant improvements verified by fatigue tests.

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AN example of the practical application of endurance data to rope engineering may be of interest.

It was found that two lots of wire acceptable under the specifications for inclusion in the same grade had a difference in endurance limit of 12 per cent. Assuming a hypothetical rope of ⅝ in.—6×19 Warrington Construction operating safety factor of 4 to 1, rope made from wire A can be operated over a 23-in. sheave, but for equal life, rope made from wire B must be operated over a 29-in. sheave. Expressed differently, the two ropes would have a theoretical difference in life of 40 per cent when used over 23-in. sheaves.

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AN interesting adaptation of the fatigue test method described above to the measurement of abrasion resistance of wire has

(*Please turn to page 305*)

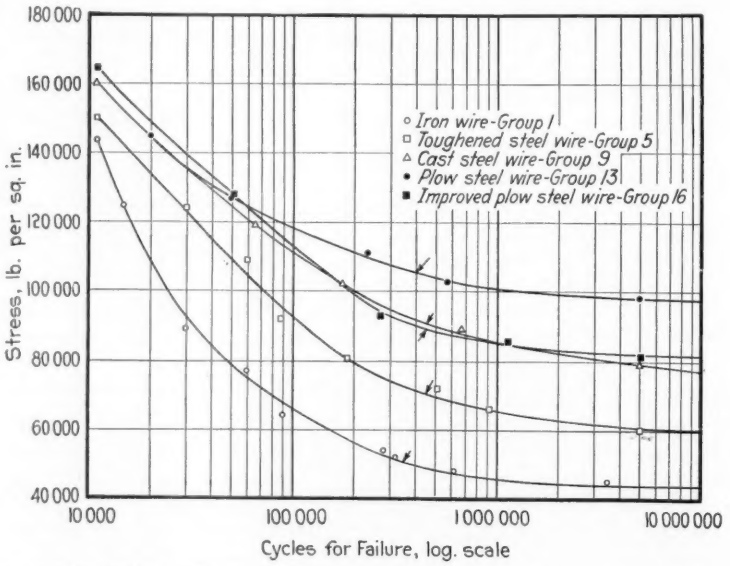

Fig. 3. Showing Typical Cyclic-Stress Diagrams for Rope Wire. ✦ ✦ ✦ ✦

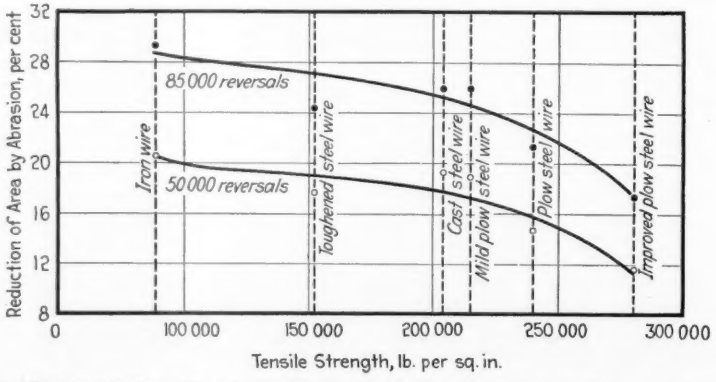

Fig. 4. Showing Relation of Tensile Strength to Abrasion Resistance of Rope Wire. ✦ ✦

Process on Reel and Spool Simplification

By P. M. Mueller, General Cable Corp., Rome, N. Y.

Vice Chairman and Secretary, Manufacturers Committee on Reel and Spool Simplification

THE newly organized Manufacturers' Committee for Reel and Spool Simplification held its first meeting at Waterbury, Connecticut on August 4th, for the purpose of electing permanent officers and consolidating plans for future effort.

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THIS committee is an outgrowth of the organization as Standing Committee No. 63, Division of Simplified Practice, Department of Commerce, which has been working on the problem of unification of proportions and reduction in number of spool and reel sizes for the past several years, since 1927.

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THE work of the older and larger committee has been recently brought to the condition where —from a technical point of view— the proportions of reels and spools advocated are generally satisfactory to a representative group in the wire industry. The remaining portion of the work necessary, which will be concerned largely with acquainting all the manufacturers of wire equipment with the recommended proportions in detail, can be best handled by a small committee. This accounts for disbanding the older committee and the recent reorganization.

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THE personnel is as follows:

Spool & Reel Manufacturers' representatives—

Frank Mossberg, Mossberg Pressed Steel Co. (Chairman).

R. B. Hayward, The R. B. Hayward Company.

E. J. Hubbard, Hubbard Spool Company.

Wire Equipment Manufacturers' representatives—

J. P. Barclay, Wire Machinery Corp. of America.

W. D. Pierson, Waterbury-Farrel Foundry & Machine Co.

R. W. Withington, American Insulating Machinery Co.

L. A. Vaughn, Vaughn Machinery Company.

Technical Advisory Group—

R. E. Bassett, American Brass Co.

E. W. Clark, General Electric Co.

E. F. Gould, Anaconda Wire & Cable Co.

P. M. Mueller, General Cable Corp., Rome, N. Y. (Vice-Chairman and Sectary.)

✦ ✦ ✦

AT the present time, the industry has a very considerable investment in spools and reels, most of which are in good condition and serviceable for several years to come. It is felt that any attempt to establish a rigorous national standard immediately would result in unwarranted depreciation of the value of the inventory.

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HOWEVER, the diversity in proportion and approximate duplication of sizes in this total group is so great that it is highly desirable to unify the design of purchases of equipment from the earliest possible moment, lest the present uneconomic disorganization be continued indefinitely into the future.

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NO complete listing of proportions now in use has been possible, but from what data is available, it is safe to assume that more than 1000 combinations of dimensions of flange diameter, traverse and barrel are current. The proposed list reduces this number to 32, grouped as follows:

Group 1—Five shop and shipping spools, including 6" flange diameter and holding up to 14 lbs. of bare copper wire.

Group II-A—Ten shop spools, ranging from 16 to 700 lb. capacity, and adapted to all types of processing, such as wire drawing, annealing, stranding, tinning, etc.

Group II-B—Five shipping spools, ranging from 50 to 500 lbs. capacity and adapted to the packaging of magnet and various kinds of insulated wire.

Group III—Twelve reels ranging from 30" to 84" flange diameter, for all classes of bulky material. This list includes and is based on the previous recommendation of IPCEA, which have already greatly influenced the proportions of large reel equipment.

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IT is not expected that the proposed lists can be adopted as shipping packages to any extent for some time to come, as it will be necessary to use up the current inventory of reel and spool equipment before this can occur. It is expected, however, that all equipment manufacturers; that is to say, spool and reel makers, builders of wire drawing, stranding machinery and that class of material in which the wire package is part of the machine, will adopt the new proportions and so design new product that it will accept both the recommended sizes and the present proportions. Some work along this line has already been done, from which it would appear that

(*Please turn to page 304*)

Outstanding Personalities of the Wire Industry

RICHARD E. BROWN
Major Spec.-Res. U. S. A.
Secretary, The Wire Association
President, Wire & Wire Products, New York, N. Y.

BY direction of the President of the United States, Richard E. Brown, publisher of WIRE AND WIRE PRODUCTS and Secretary of the Wire Association has been commissioned as Major in the Officers Reserve Corps., Army of the United States.

Major Brown has been placed in the Arm and Assignment Group of the U. S. Army, and assigned to the Supply Division, Procurement Activities, Office of the Chief Signal Officer, Washington, D. C., for duty in time of national emergency.

Major Brown possesses a highly specialized knowledge of the sources of supply of wire and wire products as well as a background of many years service as a commissioned officer in the Coast Artillery Corps., N. G. N. Y. and this specialized knowledge and training makes him particularly well qualified to perform the duties of the office to which he has been appointed.

In 1926 Major Brown acquired the publication "WIRE & WIRE PRODUCTS" and almost immediately become engaged in promoting the interests of the wire industry.

In 1930 he organized the first meeting ever held of wire mill production men at Buffalo, N. Y., and this meeting resulted in the organization and development of the present Wire Association of which he is Secretary and a director.

Under authority of F. H. Payne, the Assistant Secretary of War in charge of Procurement Planning, the Wire Association is now undertaking a survey to determine the productive capacity of the wire industry which would be available in the event of emergency. The data resulting will be used to determine placements of emergency orders for wire and wire products and Major Brown has been selected to undertake this survey.

H. C. THOMAS
Assistant To General Works Manager
Westinghouse Electric & Mfg. Co.

H. C. Thomas has been appointed assistant to general works manager of the Westinghouse Electric & Mfg. Company. He is being advanced from the position of director of manufacturing stocks, which appointment was received in September 1929.

Since his graduation from Purdue University in 1910, Mr. Thomas has held various positions with the Westinghouse company. He first was employed in the repair department, then in 1912 was transferred to the circuit breaker and switch section of the supply department. In 1916 he became a supply department salesman in St. Louis. His work was interrupted during the war, but in 1919 he returned to St. Louis.

On the creation of the merchandising department in 1922 he went to New York as assistant to manager. The merchandising department was moved to Mansfield in 1925 and in April, 1927, he was appointed to the position of assistant general manager of the merchandising department with offices in Mansfield, Ohio. That position he held until he received the position of director of manufacturing stocks in 1929.

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W. R. Phibbs, Vice-president Columbia Steel Company

COLUMBIA Steel Company, subsidiary of the United States Steel Corporation, has promoted W. R. Phibbs, general manager of Columbia's plant at Ironton, Utah, to the position of vice president and general manager of all the company's plants, with his headquarters at San Francisco. The change took effect June 1st. C. T. Keigley, superintendent of the Ironton plant, succeeded Mr. Phibbs as general manager.

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Earl C. Smith, Chief Metallurgist for Republic Steel Corporation

Earl C. Smith, assistant manager of the Central Alloy division of the Republic Steel Corporation, has been appointed chief metallurgist of the company, with headquarters in the Republic building, Youngstown. He will cooperate with the Republic company's customers in selection and application of steel and will direct research work. Mr. Smith graduated in 1913 from Ohio State University.

'Round the World With the Wire Industry

New British Wire Alloys

ONE of the largest British wire manufacturing firms, the Telegraph Construction & Maintenance Co., Ltd., has entered into an arrangement with Wild-Barfield Electric Furnaces, London, whereby the latter will distribute a series of new electric resistance alloys. These include Pyromic 80/20 nickel chromium for temperatures up to 1,150° C.; and Calomic nickel-chromium iron for temperatures up to 1,000°C. These alloys, which are supplied in wire and rod, are induction melted in electric induction melting furnaces. This method of manufacture, while in no way increasing the price, definitely eliminates all impurities. Owing to the absence of carbon, manganese, sulphur, etc., elements manufactured from these alloys have a long life, and freedom from hot spots, cracks, and surface disintegration. Pyromic nickel chrome has been under strenuous actual working tests in Wild-Barfield furnaces for several years past, while Calomic wire has been used by makers of domestic heating apparatus with the highest degree of success.

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British Investigating Wire Drawing Dies

WORK of great interest and importance is now being undertaken at the Applied Science Department of the University of Sheffield through the generosity of the Ironmongers' Company. Many difficult problems are being investigated, chief among them being the question of the most serviceable form of drawing die for the cold-drawing of wire and straight bars. Following upon this is a study of the effect of drawing on the physical properties of the steel. A number of dies have been made in the University and compared with those at present in use in the British wire industry. The results of these comparisons are being awaited with great interest by the entire industry.

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AS the effect of cold working upon steel is probably governed to a large extent by the nature of the steel itself, as well as by the character of the preliminary hot rolling to which it must be submitted, a full study of these factors is being made by the University researchers. There is every reason to expect that great benefit will result to the wire industry from this research.

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Long Wire Rope Made at Sheffield

ONE of the longest wire ropes in the annals of the industry has just been completed by the Sheffield Wire Rope Company, Darnall, which concern owns the largest wire rope making machine in Sheffield. The record rope is seven-eights of an inch in diameter, weighs 34 tons, and measures 11½ miles in one continuous piece.

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Japanese Imports of Wire Rods

JAPAN, it is reported, imported 65,167 tons of wire rods in 1931 —this business going, first, to the United States; second, to Germany; and third, to France. Receipts in 1931 had a value of Yen 4,219,170, while the 68,684 tons imported in 1930 were valued at Yen 5,496.358 and the 157,474 tons brought in during 1929, at Yen 13,577,258.

Figures of the Japanese domestic production of wire rods in 1931 are not available but it is of interest to note that this production rose to 122,428 tons in 1930 from a 1929 total of 68,471 tons.

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IWECO Abandons Fixed Export Prices

AS reported previously the IWECO decided last month to abandon the system of fixed prices for export. In place of the uniform prices for each market flexible quotations have been introduced with apparent success, although the demand for wire as a whole is rather bad. Under the flexible quotation system, prices for wire nails have been reduced as much as £4.10 (gold) basis for certain markets as, for example, The Argentine Republic and Ireland, whereas for other markets, as for example, China, Venezuela, Palestine, Egypt, etc., the prices are £5.50-5.10 without affecting the buying movement. For barbed wire and fencing wire the difference is 22-25 shillings per ton.

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Wire Fencing Construction Changes

UP to now the Standards for wire fencing which have been in use for the export market required tubes of 6 to 10 in. lengths with a pressed head and holes fitted for the wires. Now however standards are used and are in strong demand mainly in Latin America, Africa and Europe which are punched from sheets and have a channel form and a sharp end. In these standards open tongues are cut (6 to 8 per standard) which can be closed in such a way that they hold the wire firmly. For wire the tongues are upwards, but for wire netting the button tongue is downwards in order to enable a firm fixing of the wire netting. It is said that this is the standard of the future.

✦ ✦ ✦

Germany Barters Wire For Products of South America

WIRES are now also included in barter agreements between the German trade and such countries where exchange restrictions are an obstacle against regular business. In the two weeks past barbed wire, wire netting, wire nails and baling wire has been sold to Colombia, Uruguay, Chile

(*Please turn to page 305*)

Save on Your

Winding Costs

With Winco PRODUCTS FOURX Enameled Wire

▲ ▲ ▲ All wire meets the most exacting requirements ▲ ▲ ▲

Winco PRODUCTS 4X Enameled Wire has been developed to replace single silk covered and single silk over enameled wire in the winding of small motor armatures, fans, high frequency radio transformer coils and other apparatus where high insulation values and ability to resist abrasion, are prime factors.

▲ ▲ ▲

Winco PRODUCTS 4X Enameled Wire is covered to the same dimensions as the fabric covered wires, and can therefore be wound without changes in armature slots, bobbins or winding jigs.

▲ ▲ ▲

Is superior in its ability to withstand high temperatures.

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Will withstand softening in the varnish dipping and baking operations.

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Requires little or no change in winding practice.

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Costs substantially less than the silk covered wire.

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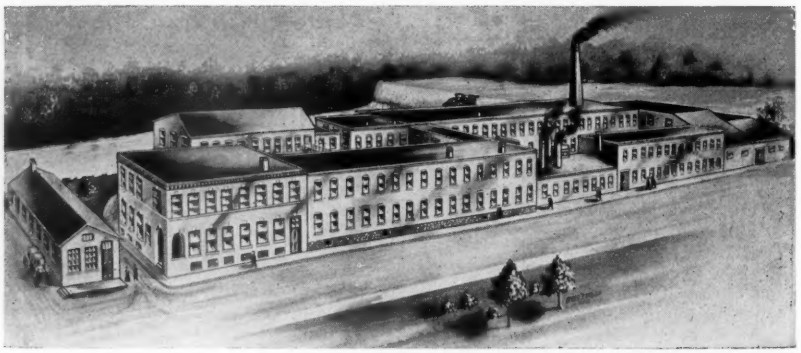
Write for samples.



GENERAL VIEW OF PLANT, WINSTED, CONN. ▲ ▲ ▲

Products of leakage currents attack insulation and shorten the life of the coil. ▲ ▲

The only test indicating what the leakage loss in a winding may be is the test in mercury, which reveals the weak spots in the enamel covering. ▲ ▲ ▲

Our method of testing all wire by mercury test before shipment is calculated to give the user the highest degree of protection. ▲ ▲ ▲

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GUARANTEED LEAK PROOF ▲ ▲ ▲

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"HUDCO" PRODUCTS...

Specially Processed Copper Wire...

For Enameling Purposes...

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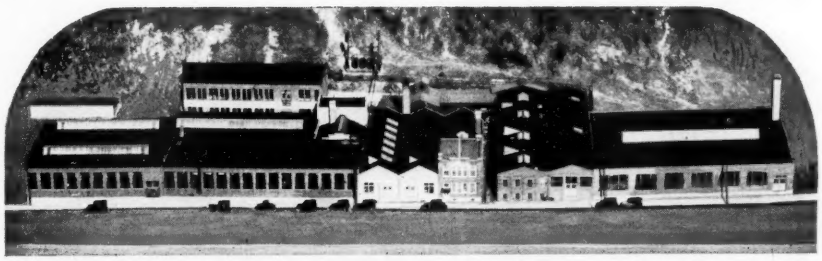


AERIAL VIEW OF PLANT OF HUDSON WIRE CO., OSSINING, N. Y. ▲ ▲ ▲
▼ ▼ ▼ FINE WIRE MANUFACTURERS ▼ ▼ ▼

"HUDCO" High Conductivity Electric Wire

OTHER FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Cadmium, 10%, 18% and 30% Nickel Silver, Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification.

BRUSH WIRES, CRIMP and STRAIGHT

Brass, Steel, Nickel Silver, Copper and Phosphor Bronze

TINSEL LAHNS

Silver Plated Copper, False Gold and Copper

METALLIC FIBRE FOR PACKING PURPOSES

Copper, Bronze, Zinc, Lead and Aluminum

WIRES FOR METAL SPRAYING

Zinc, Tin, Lead, Cadmium, Copper, Bronzes, Nickel Silver, Aluminum and other wires to specification.

ROLLED FLAT WIRE WITH ROUND EDGES

Copper, Brass, Nickel Silver, Zinc, Lead, Phosphor Bronze and other wires to specification.

"Hudco" copper wire is drawn by the Hudson Wire Company of Ossining, N. Y., who have been specialists in the manufacture of fine wires for over thirty years. ▲

The best grade of copper drawing stock is used, insuring the maximum conductivity. ▲ ▲ ▲

A new process of drawing and annealing is used which produces a wire unusually smooth, clean and uniform in color for enameling and other purposes. ▲ ▲ ▲

Painstaking care in the selection and maintenance of dies guarantees a product accurate to gauge and resistance. ▲ ▲ ▲

You can rely on "Hudco" wire always. ▲ ▲ ▲

Expert annealing of the wire prevents unnecessary breakage when winding the wire into coils ▲ ▲ ▲

If you, too, have a specific problem demanding wire of exact requirements, write to us about it. ▲ ▲ ▲

It costs nothing and involves you in nothing. ▲ ▲ ▲

Better wire at lower cost. ▲ ▲ ▲

We can serve you quickly and economically.
Send in your specifications for a quotation.

"HUDCO"
FINE WIRES

HUDSON WIRE COMPANY

Ossining, N. Y.

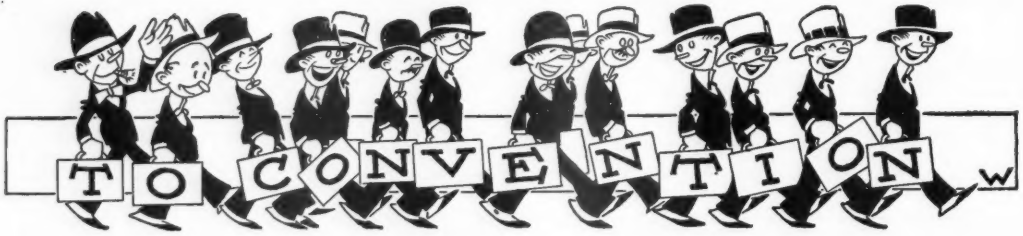
Estab. 1902 — Successors ROYLE & AKIN — Estab. 1902

"HUDCO"
FINE WIRES

All Wire Mill Men Are Invited to Attend
The Wire Association
1932 Meeting and Exhibition

Held in Association With the National Metal Congress

ARE YOU COMING?



BUFFALO, N. Y.
October 3, 4, 5, 6, 7 (inclusive) 1932

An excellent technical program will be presented and there will be a splendid exhibit of machinery and equipment in association with the National Metal Congress.

A majority of the leading men of the industry have already indicated their intention of attending and participating in the discussions of the papers which will be presented. In addition to the program set forth, a splendid opportunity is offered to discuss informally, routine problems and to exchange opinions and ideas regarding equipment and processes used in the industry.

Every wire mill production executive engaged in the manufacture or fabrication of wire and wire products of any kind is invited to attend.

REDUCED RATE RETURN TRIP RAILROAD CERTIFICATES FURNISHED TO MEMBERS OF THE ASSOCIATION

Make Your Plans Now to Come and Participate in the Discussions

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For detailed information address RICHARD E. BROWN, Secretary

THE WIRE ASSOCIATION

17 East 42nd Street — New York, N. Y.

PROGRAM

Monday, October 3, 1932, at Hotel Statler

A. M. and P. M.--Registration -- "Get Together" P. M.--Informal meeting at headquarters of The Wire Association

These meetings will be held every night from 8 to 11 o'clock during the convention.

The Technical Sessions

Program Committee

Ralph K. Clifford, Gen'l Supt., Continental Steel Corp., Kokomo, Ind., Chairman

Kenneth B. Lewis, Morgan Construction Co., Worcester, Mass. W. D. Pierson, Sec'y. Waterbury Farrell Fdry & Machine Co., Waterbury, Conn.

R. E. Brown, Secretary, The Wire Association, 551 Fifth Ave., New York, N. Y.

THERE WILL BE A REGISTRATION FEE OF $5.00 FOR THOSE ATTENDING THESE SESSIONS.

Stenographic Copies of the Discussions Will Be Available at $2.50 Per Copy.

At the technical sessions to be held Tuesday, Wednesday and Thursday, the papers will be brief and will be limited to one per session. It is intended that the time shall be spent in open discussion and exchange of experience in matters of general interest to wire mill operating men.

The discussions will cover, so far as time permits and in addition to matters arising naturally out of the papers read, a number of topics which have been suggested by members. The program committee will be glad to receive other suggestions. These topics are listed in the program schedule below.

Tuesday, Oct. 4, 1932

KENNETH B. LEWIS

Morgan Construction Co., Worcester, Mass.

Chairman of Meeting

Morning Session—at Hotel Statler at 9:30 A. M.

Paper A—"WIRE DRAWING AS A HANDLING PROBLEM"

By L. D. Granger, Asst. to Vice-Pres. and Chief Metallurgist, Wickwire Spencer Steel Co., New York, N. Y.

Additional topics for discussion:

1. ACID STORAGE—What tonnage justifies purchase in tank cars—how to store muriatic acid. Sulphuric in steel pickle tubs with inhibitor—rubber lined tubs for pickling—acid proof steel—effect of inhibitor on finish—accelerated cleaning by moving rods—agitation of acid by air—temperature regulating devices.

2. LIME—Under whose supervision—how closely checked—permissible content of silica and magnesia—any other properties tested for—standards for heavy, medium and light lime—how checked for lime value while running—what causes deterioration in use—when dumped on what test—what consumption per ton wire—where does it go—is waste lime salvaged—can you get heavy coat from light lime tub by redipping—substitutes for lime.

3. CLEANING LAYOUT—Straight vs. circle, what arguments for each
   (A) MASONRY TUBS—what size tile—glazed or not—what binder—how is top rail secured—how full is tub worked—Single long tub or partitions.
   (B) CRANE—bridge, gaintry or monorail—motors high or low—electrical spares—tonnage cleaned per line—what limits it.
   (C) HOOK—Full swivel and tilt, or rigid type lifted at 2 points—advantages of each.
   (D) SULLING—How long?—why does this vary from mill to mill—effect of lime in water—steam coat—acid coat—sulling and re-coating of hard drawn wire.
   (E) DUNN—Process of electrolytic cleaning.

Afternoon Session—2 P. M., at 174th Regiment Armory

Paper B—"PLANT MANAGEMENT"

By J. C. Callaghan, Works Manager, Steel Company of Canada, Ltd., Hamilton, Ont., Canada

Paper C—"COST ACCOUNTING"

By R. F. Cohn, Plant Manager, The Reynolds Wire Co., Dixon, Ill.

Additional topics for discussion:

4. FOREMEN'S MEETINGS—How often—what discussed—to what extent are cost sheets shown and discussed—to what extent understood—are outsiders invited to explain cost system—regulations as to goggles and gloves—general set-up for safety.
5. BAKER—should wet rods enter hot end first—preheated air and forced circulation—how hot and how long time compared with old practice—what troubles—should air be bled out or recirculated—is steam heated air hot enough—what is the minimum baking time for good market wire—how promptly should wet rods reach baker.

Wednesday, Oct. 5, 1932

Non-Ferrous Sessions

W. D. PIERSON
Secretary, Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.,
Chairman of Meeting

Morning Session—9:30 A. M. at Hotel Statler

Paper D—"COPPER ROD ROLLING, WIRE DRAWING AND ANNEALING"

By John R. McKean, Supt., American Electrical Works, Phillipsdale, R. I.

Paper E—"PROCESS CONTROL IN MANUFACTURE OF RUBBER COVERED WIRE"

By E. G. Sturdevant, United States Rubber Co., Bristol, R. I.

Additional subjects for discussion:

6. What is a Vacuum Drier and why and how is it used?
7. Is there any difference in the quality of the ingots used for making fine wire, say No. 38 and smaller, or in the method of rolling or drawing, and is there any way to distinguish the good ingots from the bad?
8. On single hole work, what is the minimum number of drafts from the rod with which it is possible to produce good wire as to finish etc., without regard to any tensile strength requirement?
9. What is the effect of tensile strength of hard drawn wire of diameter of rolls ,slip, dip temperature, etc.? What, if any, is the limitation of a continuous machine for making A. S. T. M. specification wire?
10. Can tungsten carbide dies be successfully used in conjunction with diamonds in the same set up? What is the smallest size tungsten carbide die recommended for copper? Are tantalum carbide dies considered satisfactory for copper?
11. Are any definite figures available as to die costs per 1000 lb. of wire drawn, both in tungsten carbide and diamond dies?
12. What is the usual percentage of scrap in drawing wire and to what extent does it increase operating costs? How does the percentage increase with the fineness of wire drawn?
13. What is the proper annealing temperature for fine wire?
14. Why does such a difference exist in opinion as to the proper tightness of the winding of a spool of fine wire, and at what size does the tightness become a very important factor?
15. Is there anything in the theory that in drawing fine wire it is desirable to split the drafts after perhaps No. 38?
16. It is considered good practice to anneal somewhere in process when making fine wire? If so, what is the smallest size to be made without annealing?
17. What does it cost to anneal wire?
18. For annealed fine copper wire, what is the comparison between annealing on metal spools and passing spooled hard drawn wire at a comparatively low speed through an annealing furnace and respooling? How fine is it possible to go on the latter?
19. In drawing fine copper wire, say No. 36 to No. 40 B&S, on a continuous machine, is it a better proposition to operate 12 to 16 dies, or start at a heavier size and operate 20 to 22 dies?
20. What is the usual practice in drawing speed for brass, bronze and German silver as compared with copper, also the number of dies which can be operated without annealing?

Thursday, Oct. 6, 1932

RALPH K. CLIFFORD

General Supt., Continental Steel Co., Kokomo, Ind.
Chairman of Meeting

Morning Session—9:30 A. M. at Hotel Statler

PATENTING

By R. B. Whyte, General Supt., The MacWhyte Company, Kenosha, Wis.

Additional topics for discussion:

21. DIES, TUNGSTEN CARBIDE—What records kept of issue and return—Is there more skin-hardening effect than from other types of die—Is water cooling advantageous?
22. SOAP consumption per ton—regulations of issue—individuals checked—what proportion wasted—what moisture allowed—is soap useful in process drafts—lubricating plugs—do they feed more soap—is this desirable—does it affect die-pull or life of coating?
23. CAST IRON DIES—Average re-cuts per hole—effect of high polish—largest safe hole for given weight of die?
24. GAUGE SYSTEMS—How many wire-drawers carry micrometers—what percentage wire tested by micrometer—what prevents dropping of gauge numbers—is there anything beyond trade practise—can these objections be met?

Afternoon Session—2 P. M. at 174th Regiment Armory

Paper G—"STAINLESS STEEL"

By Earl Smith, Chief Metallurgist, Republic Steel Co., Youngstown, O.

Additional topics for discussion:

25. NAILS—How heavy bundles on reels—how far can helpers be eliminated by heavy bundles—life of knives and dies in continuous running—elimination of tote boxes—to what extent tried—what saving in helpers—what objections.
26. TUMBLERS—What speed—what limits speed—how full and why—speed and stroke of shakers—what determines it—disposition of nail whiskers—standards in head and point.
27. CONTINUOUS MACHINES—What is minimum number of drafts profitable—What is maximum on one machine—What average output gain—Effect on handling—can good market wire be made—how about percentage scrap—attitude of labor—floor space—safety-die life—effect on high carbon wire?
28. TINNING—What limits speed—Does tin kettle affect hardness of drawn wire?

Friday, October 7th, 1932

10 A. M. At Hotel Statler

Annual Meeting of The Wire Association

Presiding—John Mordica, Supt. Rod & Wire Mills, Bethlehem Steel Co., Sparrows Point, Md., President of the Wire Association.

Discussion of Industrial Preparedness Plan for The Wire Industry—Major Richard E. Brown, Spec.-Res. U. S. A.
Report of Industrial Preparedness Committee—L. D. Granger, Chairman
Address By Representative of War and Navy Departments
General Business of the Association:—
Election of New Directors
Financial Report
Plans for 1933 Meeting
Reports of Committees
New Business.

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THE WIRE ASSOCIATION, 17 EAST 42ND STREET, NEW YORK, N. Y.

A Review of Recent Wire Patents

No. 1,865,461, ARMATURE WINDING MACHINE, Patented July 5, 1932, by Rodger J. Emmert, of Dayton, Ohio, Assignor to Delco-Remy Corporation, of Dayton, Ohio, a Corporation of Delaware.

The machine is provided for winding wire into the slots of an armature core, the machine being so constructed that it will prevent the wire which passes around the ends of the core from covering any portion of those slots which are between the slots into which the wire is wound. The inventor provides a winding head which guides the wire, as the core is rotated about an axis at right angles to its own axis, in such a manner that the wire lying adjacent the ends of the core will be kept out of the winding region of other coils to be wound.

✦ ✦ ✦

No. 1,865,781, WIRE DRAWING MACHINE, Patented July 5, 1932, by Garabed Najarian, of New Haven, Connecticut.

Particularly, this invention relates to multi-draw machines, and the inventor provides a pair of drawing die passages of different diameters, a first-draw pull-reel for drawing the wire through the larger of the passages, a second-draw pull-reel for drawing the wire through the smaller of the passages, with an idler-reel disposed between the two pull-reels.

✦ ✦ ✦

No. 1,866,418, CABLE IMPREGNATING APPARATUS, Patented July 5, 1932, by Walter Neuhold, of Berlin, Germany.

The device is stated to be particularly adapted for the impregnating of electrical cables, and includes a pipe within the displacer of the saturation vessel, which cooperates with the displacer to suck off any vapors, while moisture, etc., will accumulate at the bottom of the displacer adjacent the pipe.

✦ ✦ ✦

No. 1,866,705, ROUND WIRE TENSIONING MECHANISM, Patented July 12, 1932, by Herbert Harvey, of Los Angeles, California.

This is a portable device for tensioning wire about a box, crate, or the like, the device tying the two bights together while the wire is held in tension.

✦ ✦ ✦

No. 1,866,837, CHAIN, METHOD, and METHOD OF WELDING, Patented July 12, 1932, by Harry C. Brown, of Westwood, New Jersey, Assignor to Henry B. Newhall Corporation, of Garwood, New Jersey, a Corporation of New Jersey.

The method includes forming an open link, heating the link to a welding heat, and progressively welding or knitting the open portions of the link by a plurality of progressive blows each delivered over a comparatively small area of the welding surface, thereby extruding and forcing out of the weld substantially all foreign matter and impurities and increasing the strength of the weld.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.

No. 1,866,850, REENFORCED WIRE FABRIC AND METHOD OF MAKING THE SAME, Patented July 12, 1932, by Irving A. Green, of Worcester, Massachusetts, Assignor to The Washburn Company, of Worcester, Massachusetts, a Corporation of Massachusetts.

Reenforced wire fabric provided by this invention is stated to be particularly adapted for use in making strainers. and other kitchen utensils. The inventor provides equally spaced warp wires with groups of closely lying warp wires, disposed at intervals between the other warp wires, the weft wires being equally spaced.

✦ ✦ ✦

No. 1,866,952, WIRE TWISTING MACHINE, Patented July 12, 1932, by John Gallagher Steele, of Latrobe, Pennsylvania.

For the purpose of twisting together the wire ends of wire attached to dynamite caps, as required by law, the inventor has provided an automatic machine for that purpose.

✦ ✦ ✦

No. 1,867,560, NAIL DISTRIBUTOR, Patented July 19, 1932, by John M. Benjamin, of Beverly, Massachusetts, Assignor to United Shoe Machinery Corporation, of Paterson, New Jersey, a Corporation of New Jersey.

Employed for supplying nails in successive groups to apparatus which is to insert them, the inventor has provided a distributor having a new arrangement of nail-holding drums which may supply simultaneously different lengths of nails, and a new organization of nail-positioning or clearing devices associated with the drums and raceways provided, and which are said to eliminate clogging.

✦ ✦ ✦

No. 1,867,581, ROD BENDING MACHINE, Patented July 19, 1932, by Alphonso H. Marietta, of Akron, Ohio.

Particularly, the machine is adapted for bending truss rods for fabricated joints, the machine progressively bending the rod into regularly recurring steps, by the employment of fluid pressure.

✦ ✦ ✦

No. 1,868,141, WIRE TYING MACHINE, Patented July 19, 1932, by Herbert Harvey, of Los Angeles, California.

By the use of this wire tensioning machine, which is provided for drawing wire tightly around packing boxes and the like, the wire is stated to be uniformly tensioned throughout its length rather than at local points in the loop formed, and the wire will not deform or indent.

✦ ✦ ✦

No. 1,868,315, CONTINUOUSLY LOADED CONDUCTOR, Patented July 19, 1932, by William C. Ellis, of Rockville, New York, Assignor to Bell Telephone Laboratories, Incorporated, of New York, N. Y., a Corporation of New York.

So as to provide looseness of the magnetic loading material from the copper wire conductor, the inventor provides an application to the wire conductor under the magnetic loading material of paraffin wax, which is solid at room temperature and evaporates below 400° C.

✦ ✦ ✦

No. 1,868,586, CONNECTOR FOR WIRE FABRICS, Patented July 26, 1932, by Clarence E. Pink, of Cambridge, Maryland.

This invention relates to wire connectors for woven wire belts, the connectors having relatively spaced twists forming wire loops or eyes, through which are passed a convolution of the right and left hand coiled strands of adjacent sections of the ends of the belt.

✦ ✦ ✦

No. 1,868,667, COIL WINDING MACHINE, Patented July 26, 1932, by Wilmer J. Leidy and Nick Knuth, of Chicago, Illinois, Assignors to Chicago Transformer Corporation, of Chicago, Illinois, a Corporation of Illinois.

For the winding of wire about a mandrel in the making of electrical transformers and the like, the inventors make provision for the winding of a plurality of coils in endwise spaced relation which when finished are severed.

✦ ✦ ✦

No. 1,868,968, MACHINE FOR THE MANUFACTURE OF WIRE NETTING WITH HEXAGONAL MESHES OF VARIABLE WIDTH, Patented July 26, 1932, by Rosa Ros Casablancas, of Tarrasa, Spain.

Essentially, the machine comprises two horizontal rulers, one over the other. the upper carrying a series of pinions radially slotted and moved by a rack, which pinions, in turning, give the wires the twist in two directions. The lower ruler contains the organs which impart to the wires the twist in a single direction, and consist of a series of revolving heads, actuated by a rack.

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Exports and Imports of Wire

Exports of iron and steel wire products in April, 1932 and May, 1932
(In gross tons)

	June 1932	May 1932	June 1931
Wire rods	693	1,048	2,412
Hoops, bands, and strip steel	883	2,208	1,695
Plain black or galvanized iron or steel wire	468	696	964
Barbed-wire and woven-wire fencing	1,384	1,732	1,705
Woven-wire screen cloth	51	67	63
Wire rope	67	135	194
Insulated iron or steel wire and cable	3	3	24
Other wire and manufactures	182	165	335
Wire nails	483	496	616
Tacks	34	44	48
Other nails, including staples	251	272	272
Bolts, machine screws, nuts, rivets and washers	193	205	344
Total, these 12 classifications	4,692	7,071	8,672

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement and other bars	6,645	6,638	8,043
Wire rods	457	388	564
Barbed wire	1,759	909	857
Round Iron and steel wire	199	183	280
Telephone and telegraph wire		5	4
Flat wire and strip steel	56	85	25
Wire rope and strand	197	217	206
Other wire	86	69	32
Hoops and bands	2,382	1,989	1,633
Nails, tacks and staples	998	751	860
Bolts, nuts and rivets	16	10	6
Total, these 11 classifications	12,795	11,244	12,510

IMPORTS of iron and steel products into the United States were smaller in June than in any preceding month of the year since February, and totaled 34,494 gross tons, or 5,275 tons (13 per cent) less than in May. The trade was not marked by any unusual features—a series of reductions in the trade in 18 classes of material being great enough to offset the gains registered by 14 classes.

✦ ✦ ✦

AS noted above, neither increases nor losses in outstanding amounts featured the June import trade. Among the 14 increases was one of 1,097 tons in merchant steel bars and another of 850 tons in barbed wire, while chief among the 18 decreases were those in pig iron (2,215 tons), scrap (1,705 tons), and concrete reinforcement bars (1,080 tons).

✦ ✦ ✦

AMONG the supplying countries gains were shown by Belgium, Germany, and the United Kingdon, respectively in June, as compared with May, while reductions were shown by France, the Netherlands, Canada and India. Among the chief items comprising Belgium's totals were concrete bars, 3,304 tons, and merchant bars, 1,631 tons. In the trade with Germany (4,936 tons) hoops (1,025 tons), barbed wire (786 tons), and merchant steel bars (692 tons) were the leading items.

✦ ✦ ✦

IMPORTS of iron and steel products over the first six months of 1932 were 23,536 tons smaller than those in the similar period of 1931. That this difference was not greater is due to a series of sharp gains in the receipts of such items as pig iron (19,380 tons gain), tin plate (7,132 tons), barbed wire (4,838 tons), hoops and bands (2,052 tons), and nails, tacks, and staples (1,314 tons). Against and offsetting these increases were reductions amounting to 19,816 tons in the trade in structural shapes, to 9,590 tons in ingots, to 4,784 tons in merchant steel bars, to 3,445 tons in scrap, and to 2,862 tons in concrete reinforcement bars.

✦ ✦ ✦

RECEIPTS of card clothing dropped to 4,585 square feet valued at $4,585—the entire quantity coming from the United Kingdom.

WIRE cloth and screening imports were slightly greater, at 28,261 square feet, of which 17,672 originated in Germany, 5,938 in Canada, and 4,401 in France.

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FOURDRINIER wire receipts were considerably increased, at 83,715 square feet, of which 33,385 originated in France, 22,683 in Germany, 21,917 in Austria, and the rest in Sweden.

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WIRE fencing and netting imports were also considerably greater in June—that galvanized before weaving totaling 3,949,030 square feet (2,147,250 from Germany, 1,275,000 from the Netherlands, and 526,180 from Belgium), and that galvanized after weaving 5,614,300 square feet (3,673,025 from the Netherlands, 1,714,975 from Germany, and the remainder from Belgium).

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WIRE heddle imports at 226,000 pieces were less than one-half as great as in May—150,000 heddles having come from Belgium and the rest from France.

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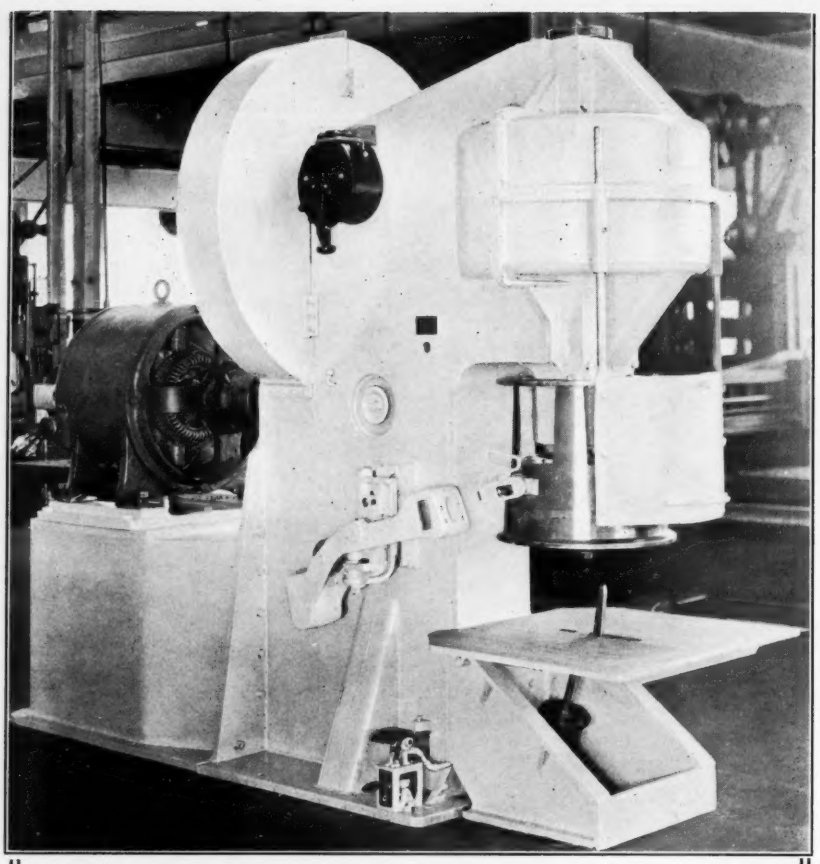
AFTER three months of consecutive gain, exports of iron and steel products from the United States turned sharply downward in June, to total only 52,081 gross tions. Despite this drop, however, this total exceeded that of any one of the first three months of 1932. The trade for the first six months of the current year totaled 321,755 tons, 243,506 tons under the total for the comparable period of 1931, with shipments to every quarter of the globe—with the exception of the Far East, where Japanese purchases of scrap iron and steel swelled the trade—under those of the earlier year.

✦ ✦ ✦

A DROP of 24,163 tons in exports of scrap material accounted for the greater part of the 28,396-ton reduction in the volume of exports in June. The only other decrease of moment was that in skelp—always a variable item—the trade in which was less by 2,370 tons.

(*Please turn to page 304*)



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Why Adequate Lighting

(*Continued from page 283*)

IN craneways, units must be mounted high enough to clear the crane, the type of unit used depending on the mounting height. To keep the crane from impairing the illumination, it is advisable to either install additional units on the bottom of the crane, or to stagger the units above the crane, in which case the crane will cut off the light from not more than one unit at a time.

For prevention against possible accident, vapor proof units should be installed in all areas where the lamp would be exposed to explosive or inflammable gas, dust, or vapors.

✦ ✦ ✦

FOR operations requiring color discrimination or color matching, it is necessary to provide a quality of light resembling daylight. The MAZDA Daylight lamp provides an approximation of daylight quality. Where accurate color matching is necessary, Noon Sunlight or North Skylight units should be employed.

It is often essential that an intensity of illumination higher than the average be provided for certain factory operations. To give this work the amount of light needed, a new type of lighting known as "lighting plus" has proved successful. This means that more light is provided over certain areas than would be received from the general overhead lighting system, for, by means of specially designed equipment usually mounted at or near the ceiling, the intensity may be built up and directed anywhere desired. This system, which has practically all the advantages of the old drop light in providing the light where it is most needed, is highly desirable because the units are out of reach where they cannot be tampered with and put out of adjustment.

✦ ✦ ✦

Spacing, Mounting Height, and Lamp Size

TO produce uniform illumination, it is necessary to main-

tain a certain ratio between spacing and mounting height. With the modern types of lighting units, the spacing should not materially exceed the distance between the floor and the bottom of the unit. Uneven illumination can be remedied, therefore, either by increasing the mounting height of the units or by spacing them closer together.

Depending on the amount of light desired, the correct choice of lamp size can be made from 200-, 300-, and 500-watt MAZDA lamps for the usual general lighting systems, with 750- and 1,000-watt lamps suitable when the mounting height of the units is greater.

✦ ✦ ✦

Ultraviolet in Industry

LIGHTING equipment which produces ultraviolet closely resembling that in the sun's rays is steadily becoming more practicable for use in the modern factory. It is definitely known that an exposure of five minutes a day to the direct rays of the noon-day midsummer sun is sufficient to maintain health. There are many days during the year, however, when the average factory worker is unable to be in the sunlight for even that short length of time, and there are some days, of course, when he gets no exposure to the sun's rays. Furthermore, there is almost no beneficial ultraviolet radiation in winter sunlight and none is transmitted by window glass either in winter or summer. MAZDA Sunlight lamps may be installed with the general lighting system in such a manner that during the work period the worker receives ample ultraviolet irradiation for health maintenance. Because the general good health of factory workers is essential if their maximum operating efficiency is to be maintained, the provision of artificial sunlight for them is certainly justified.

✦ ✦ ✦

Maintenance

EXPERIENCE has shown that in a great many cases as much as one-half of the light paid for is lost through the lack of attention to simple maintenance require-

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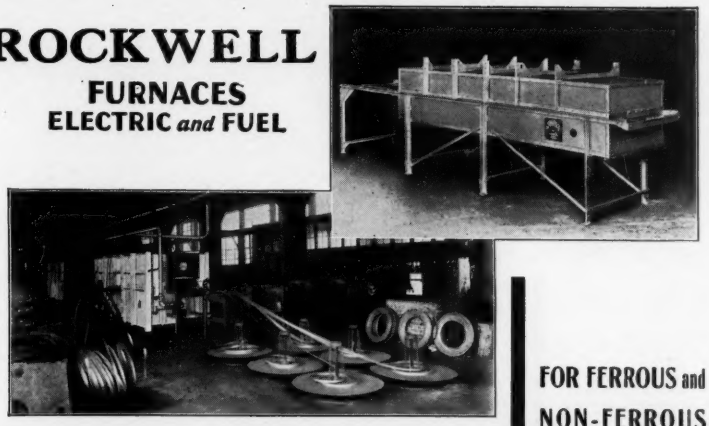

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The Wire Association

ANNUAL MEETING AND EXHIBIT

Buffalo, N. Y., October 3-7, 1932

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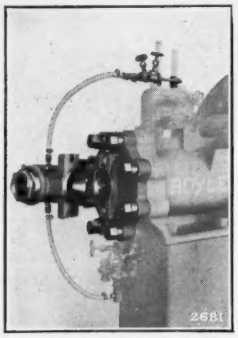

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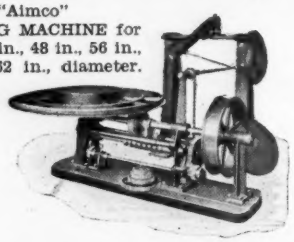

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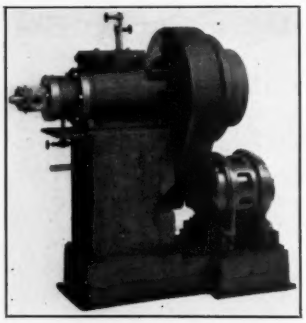

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ments. Dirty lamps and reflectors, darkened walls and ceilings, and undervoltage burning of lamps are the three results of poor maintenance which account for most of the lost light. Cleaning of the lighting units should be carried on at regular intervals, for under average conditions lighting equipment commonly depreciate 5 to 10 per cent in light output from dirt alone accumulated during the first month the lighting system is in use.

✦ ✦ ✦

THE cleaning of any lighting units will be made easier by suspending the reflectors from hooks, with separate plugs for the electrical connections. A hook suspension makes it unnecessary for the maintenance man to carry his cleaning equipment up a stepladder. He goes up the ladder with a clean lighting unit, installs it in place of the dirty one, and carries the dirty one down for cleaning. With a solid floor under his feet he does a much better and quicker job of cleaning. For out of the way places, difficult to reach without accident risk, some form of disconnecting hanger is recommended.

✦ ✦ ✦

A CONSIDERABLE portion of the light from a fixture strikes the walls of the room, the surface reflecting back a part of the light striking it and absorbing the rest. White walls reflect approximately 80 per cent of the incident light striking them; dark brown walls, on the other hand, reflect only 15 per cent of the light reaching them. Thus when the walls and ceiling are refinished in light color, the level of illumination in the rooms may be increased 50 per cent to 100 per cent.

✦ ✦ ✦

IN order to get the full amount of light from the electricity paid for, the voltage must be right. First of all, large enough wire should be used so that there is not an appreciable voltage drop between the switchboard and the lamp; and secondly, care should be taken to obtain lamps of proper voltage. Loss of light from undervoltage burning may be even greater than loss of light from dirty equipment, and it should accordingly be avoided.

Special Bronze For Telephone and Telegraph Conductors

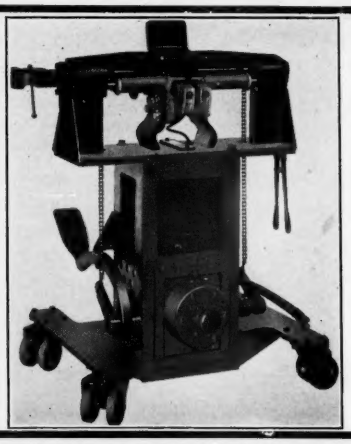
(*Continued from page 285*)

Cathodes marked NA. It is presupposed that the melting is done under a protective covering of charcoal. As soon as the copper is melted at a minimum temperature of 1200° C., the phosphor and silicium are added while the crucible is still in the furnace. It is not advisable to add the phosphor in the form of copper-phosphide. The copper-phosphide in its composition is very unstable and produces variations of 0.1% in phosphor content. It is very difficult to put into solution the proper amount of phosphor. I have used to advantage red amorphous phosphor. It is also inadvisable in the case of silicium to use previously alloyed copper silicate, for the same reasons as given for phosphor. The very best results are obtained when using pure metallic silicium. The phosphor and silicium can be added at the same time.

✦ ✦ ✦

THE crucible is then taken from the furnace, the charcoal and slag or dross removed very quickly and the tin added. After the tin has been added, the mixture is stirred thoroughly. For stirring a graphite rod is the best, because an iron rod has an effect on the resulting conductivity. After this, the cadmium is added, once more thoroughly agitated or stirred and then very rapidly poured into the mold. Great care must be exercised when adding the cadmium, because its addition produces a very agitated reaction, and considerable splashing of the molten metal may occur.

The Second Installment of This Article Outlining Hot Rolling Pratices and Rod Mill Operations Will Be Published in The November Issue



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THE Gerrard Company, manufacturers of wire tying devices, Chicago, rises to dissipate the belief that industrial concerns cannot buy new equipment now. April was the best new business month in the 15 years' history of the company, with 214 new accounts opened. March and May were above the same months of the last three years. According to V. J. Gerrity, Assistant Sales Manager, this is the result of selling optimism to their sales organization.

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ACCURATE WORK FINE FINISH

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✦ ✦ ✦

The only Soluble Inhibitor in Powdered Form on the Market

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One pound controls 300# of Acid

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There is no other Inhibitor on the Market produces such a bright finish in Cleaning Rods and Wire.

THE Wm. M. Parkin Company

Chemical Engineers to the Steel Industry 20 Years.

PITTSBURGH, PA.

Exports and Imports

(*Continued from page 299*)

THE trade with Japan, the month's leading market, was featured by the shipments of scrap to the amount of 18,905 tons, with small shipments of a number of other items making up the difference between that figure and the 21,007-ton total. The Canadian trade of 13,633 tons was featured by the shipments of 4,434 tons of black steel sheets, 2,370 tons of scrap, and 1,830 tons of skelp.

Progress on Reel and Spool Simplification

(*Continued from page 289*)

most instances will submit to such a solution easily.

✦ ✦ ✦

IF this plan is pursued, the result will be a gradual infiltration of the new proportions within the industry, at a rate which will not work any hardship other than the inconvenience of having the old and the new in the plant for a temporary period. In general, it may be said that the present inventory is so complicated by variety that the addition of the new will not add appreciably to the complexity—certainly, not to the point where the final advantages to be gained are outweighed.

✦ ✦ ✦

NO general publication of the proposed proportions will be made until it is determined that there has been sufficient adoption to warrant setting up a national standard, but the lists will be available to any individual or organization upon application to those interested a periodical bulletin which will attempt to report installations of equipment designed in accordance with the proposal.

✦ ✦ ✦

THE number of such installations in the past 18 months has already reached impressive figures, which is particularly remarkable in view of the unfavorable business conditions existing throughout the period.

✦ ✦ ✦

THE Manufacturers' Committee is not now directly affiliated with any sponsor group. NEMA, IPCEA and the Wire Association will, however, be kept in touch with the progress made, and their criticisms and suggestions given consideration.

✦ ✦ ✦

A mailing list of manufacturers of equipment is being compiled, to which will be sent the detailed description of the work of the committee to date. Since it will be impossible to have this complete at the beginning, it is hoped that those interested will advise the secretary, so that they may be included.

In the August issue of WIRE & WIRE PRODUCTS an article appearing under the title of "Improved Continuity Test for Enamel Insulation of Wires" gives the name of C. R. Moore as author. This was erroneous as the article in question was written by C. L. Erickson of the Bell Telephone Laboratories.

'Round The World With The Wire Industry

(*Continued from page 291*)

and Brazil in direct exchange against coffee, hides, fruits and other country products without referring to the money market. The total value of the transaction is nearly $100,000 and the business has been arranged through Hamburg merchants and their connections in the above named countries.

✦ ✦ ✦

THE Danish - Dutch - German - Austrian - Czecho Slovakian rivet cartel has collapsed due to the very keen Belgian competition, which made all official quotations valueless.

✦ ✦ ✦

IT has not yet been possible to get the Belgian outsiders of the wire rods cartel the Tréfileries et Laminoires d' Avers to join the wire rod cartel and the outside competition from these works is being felt more keenly from week to week, as the works have a large capacity and sell three-fourths of the output for export.

✦ ✦ ✦

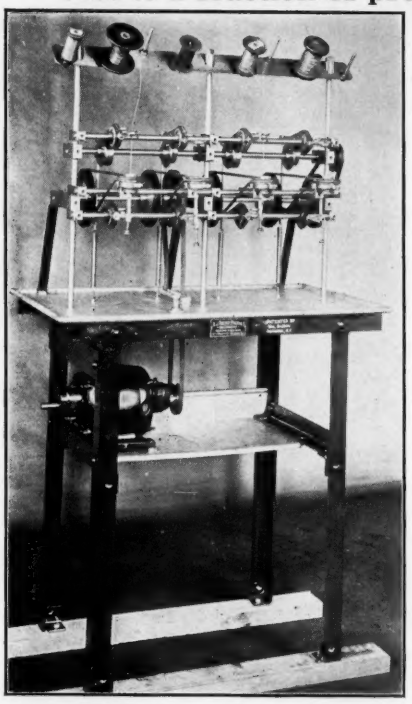
GERMANY is watching with anxiety the Ottawa conference. If a British Union is established from which German manufacturers are excluded (and nearly 50% of Germany's wire exports go to the British Empire) it is certain that Germany will impose an extra import duty on products from the British Empire. Schemes for this purpose have been already prepared.

✦ ✦ ✦

THE German industry, which formerly did not participate in the Far Eastern business in short length wires has now organized to get this business, mainly in competition against the United States and Belgian industry and the prices have been lowered—as this material is not included in the IRMA's program.

Wire and Wire Products has Moved
to 17 East 42nd Street
Corner of Madison Ave.
New York, N. Y.

The Haddow Die Re-Cutting and Polishing Machine will lower your die re-cutting cost to a fraction of present costs



Why do you continue to pay a die cutter and pay for diamond dust to remove a large percentage of your diamond from your dies? Diamond that has done no work—when, by the use of the Haddow Die Recutting Machine you may use practically all your diamonds to draw wire, especially in the small sizes.

ONE MONTH'S SHOP PRODUCTION

Total number of dies cut —1047

Total number of hours required—182.5

Average number of dies per hour—5.73

Number of operators—1

With only one man—This machine will do the work now requiring four to six men in less time and at lower cost.

4 HEAD MACHINE—Also Made in 6-Head size (With 2 Heads for Heavier Dies).

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BALLOFFET
The Quality Diamond Dies
1870 1932
BALLOFFET DIAMOND WIRE DIES CO. INC.,
13-15 East 22nd Street, New York City
Factories in France: Lagnieu-Cluses-Trevoux

The Testing of Rope Wire & Wire Rope

(*Continued from page 288*)

been worked out and a few tests run. The equipment is essentially the same except that the test sheaves are chilled cast iron. A mixture of oil and emery is fed to the point of contact between wire and sheave. The specimen is rotated at about 1800 r. p. m.; the sheave at 2 r. p. m., and wear of the wire specimen takes place. The test is continued to some predetermined value of reversals known to be under the endurance limit. The wire is then removed and gaged. A few studies were made of the rate of wear of differently processed wire. The results are encouraging but not conclusive. Figure 4 shows the general relation of tensile strength and abrasion resistance irrespective of processing or analysis.

Part II. The Testing of Wire Rope Will Appear in November

VIANNEY
DIAMOND DIES
100 FIFTH AVE · NEW YORK

Wire Industry Preparedness Plan For National Defense

A tabulation of the wire requirments of the War and Navy departments in time of emergency has been prepared by the War Department Commodity Committee No. 51, Frank W. Bullock, 1st Lieut. Signal Corps, U. S. A., chairman and is issued by authority of the Joint Procurement Board of the War and Navy Departments. The data will be presented to the industry through the Industrial War Planning Committee of The Wire Association, Mr. L. D. Granger, of Wickwire Spencer Steel Co., chairman. Richard E. Brown, Secretary of the Wire Association, Secretary, acting under such authority.

✦ ✦ ✦

THIS tabulation will give the wire industry the following information:

War Department Requirements

Bare Wire—Ferrous	Class I
Bare Wire—Non-Ferrous	Class II
Insulated Wire	Class III
Wire Rope	Class IV
Miscellaneous Fabricated Wire	Class V

Navy Department Requirements

Bare Wire—Ferrous	Class I
Bare Wire—Non-Ferrous	Class II
Insulated Wire	Class III
Wire Rope	Class IV
Miscellaneous Fabricated Wire	Class V

IN order to enable each plant to determine its capacity for meeting emergency demands, a complete set of these wire requirements will be mailed within the next four weeks.

✦ ✦ ✦

ACCOMPANYING this tabulation will be two questionnaire sheets requesting the following information:

a. List of items which the plant is best equipped to produce.

b. Details of the following:

1. Normal monthly capacity.
2. Normal operating hours per week.
3. Products consumed in own organization.
4. Product marketed directly to commercial customers.
5. Reserve capacity available for additional production in event of emergency.

✦ ✦ ✦

THIS data will place in your hands full information as to the wire requirements of the Military and Naval services of the United States. The cooperation of the plant in furnishing the desired information to the government will not only be of direct benefit to the companies complying with the request for data but should also be considered as a patriotic duty.

✦ ✦ ✦

ALL data supplied will be held in confidence and all companies sending in the information requested will be immediately placed on the list of preferred bidders of the War and Navy Departments for current peace-time business.

✦ ✦ ✦

COMPANIES supplying the data requested will also be supplied with the names of the individual officers in charge of wire purchases in the different specialized services of the War and Navy Departments, should they desire this information.

✦ ✦ ✦

MAJOR Richard E. Brown, Spec.-Res., U. S. A., will act as Secretary to the committee. All requests for information should be mailed to him at 17 East 42nd St., New York, N. Y.

Wire Drawing Diamond Dies

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Specializing in manufacture of insulated wire and cable.
Modern equipments and plants designed and installed.
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Wire Mill and Cold Rolling Equipment
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CLEVELAND, OHIO

Nationally known machinery builder wishes to take on the building of special machines for wire and steel mills, or to manufacture under license. Box 700, Wire & Wire Products, 17 E. 42nd St., New York, N. Y.

Wanted: Two large head nail machines and one 20d nail machine in exchange for four No. 5 Tiffon nail machines and fifteen No. 4 Tiffon nail machines in good condition. Texas Nail & Wire Mfg. Co., Galveston, Texas.

BUYERS' GUIDE

For more complete information, consult the annual Directory, Index & Buyers' Guide.

ANNEALING FURNACES
See Furnaces—Various Headings

ANNEALING POTS AND BOXES
National Wrought Iron Annealing Box Co., Washington, Pa.
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CHROME NICKEL—Construction
National Wrought Iron Annealing Box Co., Washington, Pa.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COILERS—Sheet and Wire
H. J. Ruesch Machine Co., Newark, N. J.

COMPOUNDS—Insulating
Corone Wire Insulators, Inc., Putnam, Conn.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

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DIES—Composition
Diamond Die Co., of America, New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Corp., New York.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
William Haddow, Ossining, N. Y.
Vianney Wire Die Wks., N. Y.

DIES—Recutting and Repolishing Machine
Wm. Haddow, Ossining, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Carboloy Co., Inc., Newark, N. J.
Driver-Harris Co., Harrison, N. J.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES—
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

FURNACES—Annealing
W. S. Rockwell Co., New York, N. Y.

FURNACES—Automatic
W. S. Rockwell Co., New York, N. Y.

FURNACES—Bright Annealing
W. S. Rockwell Co., New York, N. Y.

FURNACES—Electric
W. S. Rockwell Co., New York, N. Y.

FURNACES—Lead Melting
John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
W. S. Rockwell Co., New York, N. Y.

FURNACES—Wire
W. S. Rockwell Co., New York, N. Y.

GALVANIZING ENGINEER
W. H. Spowers, Jr., New York, N. Y.

GALVANIZING KETTLES—
National Wrought Iron Annealing Box Co., Washington, Pa.

INHIBITORS—
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LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

LUBRICANTS—Wire Drawing
R. H. Miller Co., Homer, N. Y.

MACHINE—Die Re-cutting and Polishing
Wm. Haddow, Ossining, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
Fred'k M. Conran, Newark, N. J.
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Fred'k M. Conran, Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Fred'k M. Conran, Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
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Watson Machine Co., Paterson, N. J.

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Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

BUYERS' GUIDE, Continued

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
Corone Wire Insulators, Inc., Putnam, Conn.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Measuring Wire & Cable
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rod
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
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Morgan Construction Co., Worcester, Mass.
H. L. Reusch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rubber Strip Covering
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New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Corone Wire Insulators, Inc., Putman, Conn.
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

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American Insulating Mach'y Co., Phila Pa.
Broden Construction Co., Cleveland, O.
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H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Fred'k M. Conran, Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

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MACHINERY—Straightening
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H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

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Fred'k M. Conran, Newark, N. J.

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New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

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Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
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MACHINERY—Trolley Wire
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MACHINERY—Tube Mill
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Vaughn Machinery Co., Cuyahoga Falls, O.
F. B. Shuster Co., New Haven, Conn.

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New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Universal Winding Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

PACKING—Metallic Fibre
Hudson Wire Co., Ossining, N. Y.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.

REEL AND TENSION STAND—
Sleeper & Hartley Inc., Worcester, Mass.

REEL CRUTCHES
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.

STEEL PLATE CONSTRUCTION—
National Wrought Iron Annealing Box Co., Washington, Pa.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel Plate
National Wrought Iron Annealing Box Co., Washington, Pa.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VULCANIZERS
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Enameled For Coils
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Various Kinds
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Insulated Wire Co., Winsted, Conn.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

MOVED MOVED

Wire & Wire Products and **The Wire Association**

Are Now Located At

17 East 42nd Street **NEW YORK, N. Y.**

THE WATSON MACHINE COMPANY

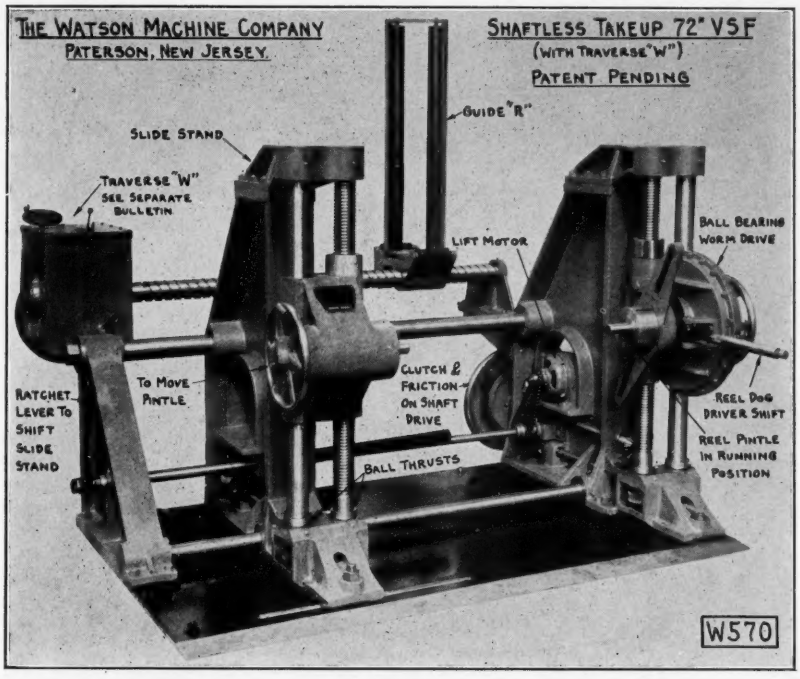
ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ENGINEERS - FOUNDERS - MACHINISTS

SHAFTLESS TAKEUPS TYPE "V"

For Heavy Duty
(Patent Pending)



THE MOST IMPORTANT SINGLE POINT OF THIS TYPE IS THE ELIMINATION OF THE REEL SHAFT.

The elimination of minor injuries to operator in handling large reel shafts is also a point of considerable value.

Two sizes are built—

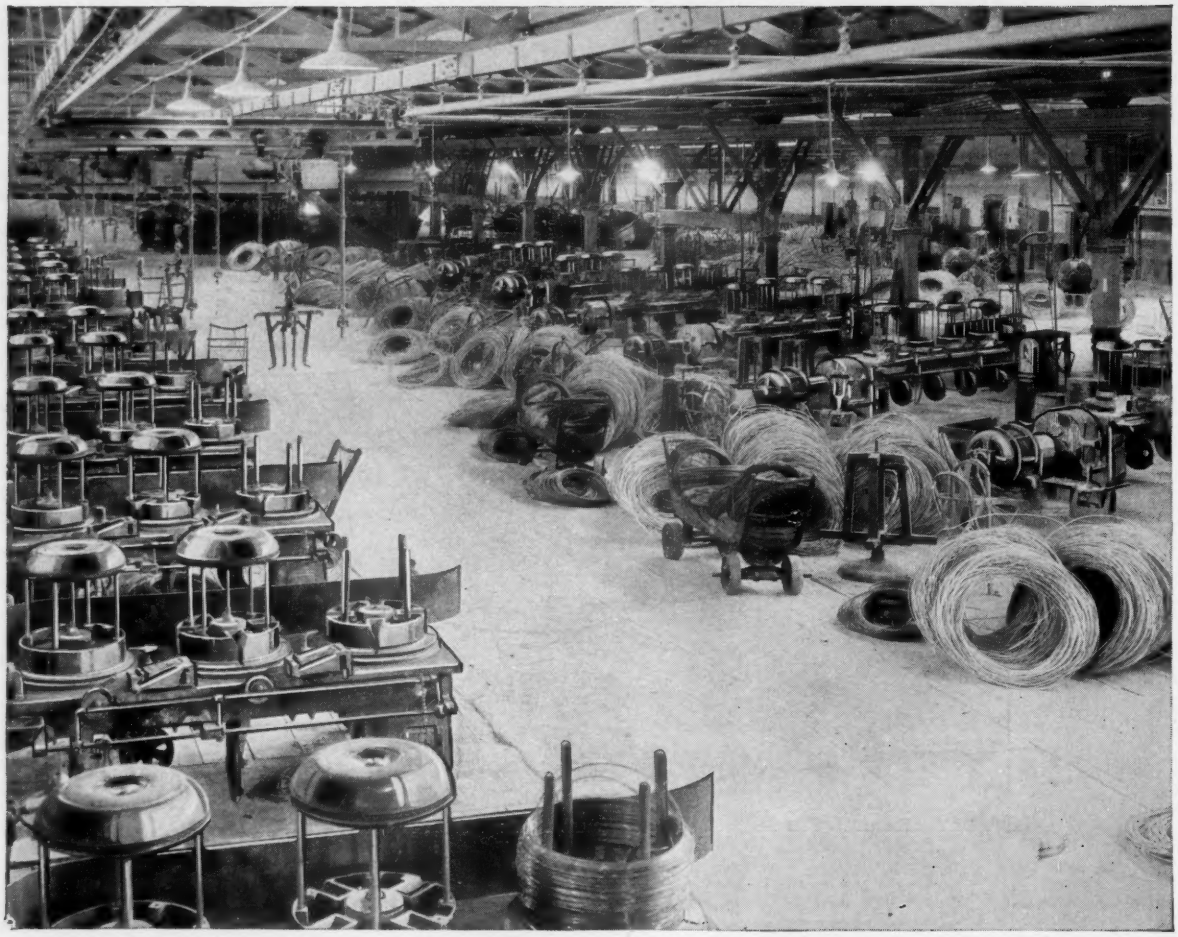
72″ for loads up to 6 tons (picking up 36″ or larger reels from base).

96″ for loads up to 10 tons (picking up 48″ or larger reels from base).

The multiple disc slip-friction is adjustable in operation and this, with the slack takeup handwheel combined with positive clutch, centers drive control at the stand in a convenient position.

ELECTRICAL WIRE AND CABLE
WIRE ROPE *and* CORDAGE MACHINERY

MORGAN
WORCESTER



Morgan-Connor Output Per Man

The measure of a wire drawer's capacity is the number of bundles he can service per shift. Output per man will be increased if servicing operations can be eliminated.

In Morgan-Connor Wire Machines the stripping of intermediate blocks is entirely eliminated.

Tonnage advantage of these machines over single blocks averages:—

1.5 in 2 and 3 draft work
2 in 4 and 5 draft work
3 in 6 and 7 draft work from annealed or patented wire.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

MALMEDIE & COMPANY, Dusseldorf, Germany
Sole Licensee for Morgan-Connor Wire Machines in Europe